

I claim:

1. A method for migrating seismic data, the method comprising:
determining a travel time;
determining a ray-bending correction;
determining an amplitude correction; and
outputting data based on said travel time, said ray-bending correction, and said amplitude correction.
2. The method of claim 1, wherein said correcting amplitude further comprises restoring essentially relative true amplitude.
3. The method of claim 2, wherein said restoring essentially relative true amplitude further comprises recovering angle dependent reflection coefficients.
4. The method of claim 3, further comprising removal of geometrical spreading factor.
5. The method of claim 1, wherein said determining an amplitude correction further comprises determining amplitude weights.
6. The method of claim 5, wherein said amplitude weights are dependent upon travel time.

7. The method of claim 6, wherein said amplitude weights further comprise takeoff and emergence angles.

8. The method of claim 6, wherein said takeoff and emergence angles further comprise:

$$\cos(\alpha_s) = \sqrt{1 - \left(\frac{\partial T_s}{\partial x_s} \right)^2} V_s^2, \text{ and } \cos(\alpha_g) = \sqrt{1 - \left(\frac{\partial T_g}{\partial x_g} \right)^2} V_g^2$$

9. The method of claim 7, wherein said amplitude weights further comprise:

$$w(\xi, R) = \frac{\sqrt{\cos \alpha_s \cos \alpha_g}}{v_s} \left\{ T_r \left[\frac{T_g}{T_s^2} + \frac{T_s}{T_g^2} \right] + \frac{4L^2 H^2 \sin^2(\alpha)}{T_s T_g T_r^2 V_r^4} \right\}.$$

10. The method of claim 7, wherein said amplitude weights further comprise:

$$w(\xi, R) = \frac{\sqrt{\cos \alpha_s \cos \alpha_g}}{v_s} \frac{|\det(\Gamma_S^T N_{SR} + \Gamma_S^T N_{SR})|}{\sqrt{|\det(N_{SR})|} \sqrt{|\det(N_{GR})|}}.$$

11. The method of claim 1, wherein said determining a travel time further comprises determining a velocity profile.

12. The method of claim 1, wherein said determining a travel time further comprises determining an offset midpoint travel time.

13. The method of claim 12, wherein determining an offset midpoint travel time further comprises:

$$T_x = \sqrt{T_0^2 + \frac{x^2}{V_{rms}^2} - \frac{2\eta x^4}{V_{rms}^2 [T_0^2 V_{rms}^2 + (1 + 2\eta)x^2]}};$$

wherein

$$\eta = \frac{\varepsilon - \delta}{1 + 2\delta}.$$

14. The method of claim 12, wherein determining an offset midpoint travel time further comprises:

$$T = \sqrt{T_0^2 + \frac{x_s^2}{V_{rms}^2} - C(VTI)x_s^4} + \sqrt{T_0^2 + \frac{x_r^2}{V_{rms}^2} - C(VTI)x_s^4}$$

wherein

$$C(VTI) = \frac{2\eta}{V_{rms}^2 [T_0^2 V_{rms}^2 + (1 + 2\eta)x^2]}.$$

15. The method of claim 1, wherein said determining a travel time further comprises determining a travel time for small offset to depth ratios.

16. The method of claim 1, wherein said determining a travel time further comprises determining a travel time for large offset to depth ratios.

17. The method of claim 16, wherein said determining a travel time for large offset to depth ratios further comprises applying essentially the following equation:

$$T = T_g + T_s + \Delta T$$

$$= T_{g0} \left(1 + \frac{1}{2} CC \frac{c_4 x_r^6}{T_{g0}} \right) + T_{s0} \left(1 + \frac{1}{2} CC \frac{c_4 x_s^6}{T_{s0}} \right) + \Delta T(VTI)$$

18. The method of claim 16, further comprising ray tracing.
19. The method of claim 16, wherein said determining a travel time further comprises determining a travel time without ray tracing.
20. The method of claim 1, further comprising correcting for VTI effects.
21. The method of claim 1, wherein said outputting the seismic data further comprises determining a time table to calculate the output imaging time.
22. The method of claim 1, wherein said outputting the seismic data further comprises outputting said data in gather modes.
23. The method of claim 1, wherein said outputting the seismic data further comprises outputting said data in non-gather modes.
24. The method of claim 1, wherein determining a travel time further comprises determining a VTI travel time.

25. The method of claim 24, wherein said determining a VTI travel time further comprises determining an offset-midpoint travel time.

26. The method of claim 25, wherein said determining an offset-midpoint travel time further comprises:

determining a migration velocity; and

determining an anisotropy parameter.

27. The method of claim 1, further comprising anti-alias filtering the data.

28. The method of claim 1, further comprising determining a number of processors required to hold target bins.

29. A system for migrating seismic data, the system comprising:

means for determining a travel time;

means for determining a ray-bending correction;

means for determining an amplitude correction; and

means for outputting data based on said travel time, said ray-bending correction,

and said amplitude correction.
30. The system of claim 29, wherein said means for correcting amplitude further
comprise means for restoring essentially relative true amplitude.
31. The system of claim 30, wherein said means for restoring essentially relative true
amplitude further comprises means for recovering angle dependent reflection coefficients.
32. The system of claim 31, further comprising means for removal of geometrical
spreading factor.
33. The system of claim 29, wherein said means for determining an amplitude
correction further comprises means for determining amplitude weights.
34. The system of claim 29, wherein said means for determining a travel time further
comprises means for determining a velocity profile.

35. The system of claim 29, wherein said means for determining a travel time further comprises means for determining an offset midpoint travel time.
36. The system of claim 35, further comprising means for ray tracing.
37. The system of claim 35, wherein said means for determining a travel time further comprises means for determining a travel time without ray tracing.
38. The system of claim 29, further comprising means for correcting for VTI effects.
39. The system of claim 29, wherein said means for outputting the seismic data further comprises means for determining a time table to calculate the output imaging time.
40. The system of claim 29, wherein said means for outputting the seismic data further comprises means for outputting said data in gather modes.
41. The system of claim 29, wherein said means for outputting the seismic data further comprises means for outputting said data in non-gather modes.
42. The system of claim 29, wherein means for determining a travel time further comprises means for determining a VTI travel time.

43. The system of claim 42, wherein said means for determining a VTI travel time further comprises means for determining an offset-midpoint travel time.

44. The system of claim 43, wherein said means for determining an offset-midpoint travel time further comprises:

means for determining a migration velocity; and

means for determining an anisotropy parameter.

45. The system of claim 29, further comprising means for anti-alias filtering the data.

46. The system of claim 29, further comprising means for determining a number of processors required to hold target bins.

47. Seismic data produced by the method comprising:
- determining a travel time;
 - determining a ray-bending correction;
 - determining an amplitude correction; and
 - outputting data based on said travel time, said ray-bending correction, and said amplitude correction.